CLAIMS

1. A thermoplastic polyurethane comprising a polyaddition product of a liquid polyethercarbonate diol with a diisocyanate and a chain extender,

wherein the liquid polyethercarbonate diol is a reaction product of a carbonate compound with a polyether diol having structural units (a) and at least one member of structural units (b) and (c) of the formulae:

units (a): $-(CH_2)_6-O-$,

units (b): $-(CH_2)_2-O-$, and

units (c): $-CH_2CH(CH_3)-O-$

the units (b) being present in an average number (n) of moles of 0 to 5 per mole of the units (a), the units (c) being present in an average number (m) of moles of 0 to 5 per mole of the units (a), and the total average number (n + m) of moles of the units (b) and (c) being more than 1 but not more than 5, per mole of the units (a).

2. The thermoplastic polyurethane as claimed in claim 1, wherein the polyether diol is selected from addition-reaction products of 1,6-hexanediol with at least one member selected from the group consisting of ethylene oxide and propylene oxide.

3. The thermoplastic polyurethane as claimed in claim 1 or 2, wherein the polyether diol has a number average molecular weight of from 150 to 450.

4. The thermoplastic polyurethane as claimed in anyone of claims 1 to 3, wherein the liquid polyethercarbonate diol has a number average molecular weight of 500 to 5,000.

5. The thermoplastic polyurethane as claimed in claim 1, wherein the liquid polyethercarbonate diol is selected from reaction products of carbonates with polyether diol compounds comprising the structural units (a) and (b), wherein the average number (n) of moles of the units (b) is more than 1 but not more than

5 per mole of the units (a).

6. The thermoplastic polyurethane as claimed in claim 5, wherein the polyether diol has a number average molecular weight of from 150 to 450.

7. The thermoplastic polyurethane as claimed in claim 5 or 6, wherein the liquid polyethercarbonate diol has a number average molecular weight of 500 to 5,000.

8. The thermoplastic polyurethane as claimed in anyone of claims 1 to 7, wherein the carbonate compound is selected from the group consisting of dialkyl carbonates, diaryl carbonates, alkylene carbonates and alkylaryl carbonates.

9. The thermoplastic polyurethane as claimed in anyone of claims 1 to 8, wherein the chain extender comprises at least one member selected from the group consisting of 1,4-butanediol, 2-ethanolamine and 1,2-propylenediamine.

10. The thermoplastic polyurethane as claimed in anyone of claims 1 to 9, wherein the diisocyanate is selected from the group consisting of 4,4'-diphenylmethane diisocyanate, 1,6-hexamethylene diisocyanate and isophorone diisocyanate.

11. The thermoplastic polyurethane as claimed in anyone of claims 1 to 10, wherein in the polyaddition product of the liquid polyethercarbonate diol with the diisocyanate and the chain extender, the chain extender is employed in amount of 0.1 to 10 moles per mole of the liquid polyethercarbonate diol and the diisocyanate is employed in a molar amount substantially equal to the total molar amount of the liquid polyethercarbonate diol and the chain extender.

12. The thermoplastic polyurethane as claimed in any one of claims 1 to 11, wherein the reaction of the carbonate compound with the polyether diol is carried out in a molar ratio of the carbonate compound to the polyether diol of 1:0.8 to 1:3.0, in the presence of a transesterification catalyst.

13. A liquid polyethercarbonate diol comprising a reaction of a carbonate compound with a polyether diol having structural units (a) and at least one member of structural units (b) and (c) of the formulae:

units (a): $-(CH_2)_6-O-$

units (b): $-(CH_2)_2-O-$

units (c): $-CH_2CH(CH_3)-O-$

the units (b) being present in an average number (n) of moles of 0 to 5 per mole of the units (a), the units (c) being present in an average number (m) of moles of 0 to 5 per mole of the units (a), and the total average number (n + m) of moles of the units (b) and (c) being more than 1 but not more than 5, per mole of the units (a).

14. The liquid polyethercarbonate diol as claimed in claim 13, wherein the polyether diol is selected from addition-reaction products of 1,6-hexanediol with at least one member selected from the group consisting of ethylene oxide and propylene oxide.

15. The liquid polyethercarbonate diol as claimed in claim 13 or 14, wherein the polyether diol has a number average molecular weight of from 150 to 450.

16. The liquid polyethercarbonate diol as claimed in anyone of claims 13 to 15, having a number average molecular weight of 500 to 5,000.

17. The liquid polyethercarbonate diol as claimed in claim 13, selected from reaction products of carbonate compounds with polyether diols comprising the structural units (a) and (b), wherein the average number (n) of moles of the units (b) is more than 1 but not more than 5 per mole of the units (a).

18. The liquid polyethercarbonate diol as claimed in claim 17, wherein the polyether diol has a number average molecular weight of from 150 to 450.

19. The liquid polyethercarbonate diol as claimed in claim 17 or 18, having a number average molecular weight of 500 to 5,000.